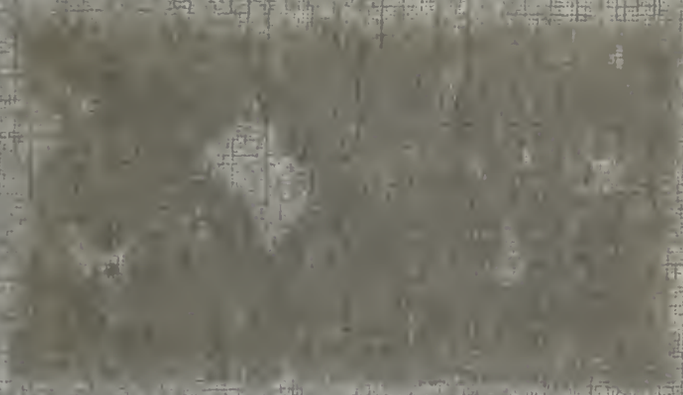

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SYLLABUS FOR
A FIRST COURSE IN EDUCATIONAL PSYCHOLOGY

Thirty Lessons Designed to Introduce Students to the Applications of Psychology to Educational Practice

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PREFACE FOR KNIGHT-RUCH SYLLABUS

For several years the authors of this Syllabus have been perplexed by the problems of organization and content of a fundamental course in educational psychology for students beginning their professional preparation in education.

The appearance of Professor Arthur I. Gates' "Psychology for Students of Education," solves very largely the problem of the content for such a course. This syllabus has been prepared to give definite organized lessons for each class period in the interest of economy of time and effort on the part of the instructor who must be responsible for large classes. The provisions for definite oral and written preparation, the comments on each lesson, together with the supplementary material in the syllabus give to the pupil straight-forward direction, aid him in his own organization of the principles of educational psychology, and thus facilitate the formation of economical habits of study to such a degree that this syllabus becomes a welcomed tool to the student.

Prepared primarily for use in the College of Education, University of Iowa, this syllabus will, however, be found helpful in universities, colleges, and normal schools using Gates' "Psychology for Students of Education."

F. B. Knight.
G. M. Ruch.

SYLLABUS FOR A FIRST COURSE IN EDUCATIONAL PSYCHOLOGY

Plan of Work

Read the next paragraphs carefully in order to have the plan of work for this course clearly in mind. The main text-book for this course is Gates' Psychology for Students of Education, 1923, Macmillan Co.

The lessons and assignments will follow this text closely. In the main each lesson in this syllabus will match a chapter in the text. It is therefore essential that the student spare no pains in the genuine mastery of each chapter. In preparing each lesson the student should be sure to do all that is asked for in the syllabus. Where directions are not clear to you, always follow this rule: do what seems seasonable.

A Plan for Preparing a Lesson

The following suggestions should be followed by the student in preparing a lesson except when he has worked out a consistent plan of work which fits his individual needs more adequately.

1. Divide your study of each lesson into two sections. Usually two hours' study will be sufficient. Put about one and one-half hours' study on the first section of your study period and about one-half hour on the second section of your study period. These two periods should be two or three hours apart.

2. Proceed as follows in the first study period:

    a. Read the lesson in syllabus with care.
    b. With the content of the syllabus in mind read the text.
    c. Answer all questions in the syllabus referring to the text when necessary.
    d. Do any reference reading called for.
    e. Make notes on any material that is important.
    f. Summarize the lesson, holding in mind the essential points.
    g. Prepare any written work called for.

3. Proceed as follows for the second section of your preparation:

    a. Answer clearly as many questions in the syllabus as you can without referring to the text or your notes. Check any question or material that you must look up again to make sure of.
    b. Re-read any material that you need to in order to have the whole assignment well in hand.
    c. Review any written work that you have previously prepared in order to make sure that it is the best that you can do.
    d. Answer all questions in the syllabus carefully to yourself. *Do not say to yourself,* "I could answer this question or discuss this topic if I were called upon." Rather, actually recite to yourself just as you would if the instructor should call upon you to give the whole lesson in one connected recitation.
    e. Use good penmanship in your written work.

LESSON 1

THE METHODS AND SUBJECT MATTER OF PSYCHOLOGY

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. I., 1-30.

(2) Robinson and Robinson: Readings in General Psychology, pp. 1-6; 9-10; and 16-20.

Read the Table of Contents, p. xi. in Gates, first; then read entire chapter quickly, organizing the material under the topics given in the Table of Contents. Finally, read the chapter again for the answers to the questions under II and III below.

II. Notes on the Lesson:

Ask yourself these questions and find answers to them as you read the assignments:

(1) Is a vivid imagination a good thing in a court witness?

(2) Do the facts described by Gates on pages 2-4 have any bearing on the question of the desirability of bringing those accused of crime to a speedy trial?

(3) In what respects are court procedures unlike psychological experiments?

(4) Do you think that a trial before 5 judges would be an improvement in the sureness of justice over the present system of 12 jurors?

(5) What bearing does the "Law of Parsimony" have on the question of the possibility of mental telepathy?

(6) Do chemists and physicists use any sort of introspection in their laboratory technique?

(7) Can experiment show the truth or falsity of the statement: "Slow learners remember longer than fast learners"?

(8) Is the "Reaction Hypothesis" better suited to explaining what goes on in business, in the school, and in actual life generally, than a psychology of sensations, images, and ideas? Justify your answer.

III. Class Preparation:

A. Required:

(1) Write out the answers to questions 3, 6, 7, 8, and 9 on pages 27-28 in Gates. Number your questions as you answer.

(2) Write out the "Completion Exereise for Review" on pages 28-29 in Gates.

B. Optional (for additional eredit):

(3) Set up eomplete rules for the earrying out of an ideal experiment for answering the ques tion: "Is reward or punishment the more effeetive method of teaehing pupils to spell"? Organize the experiment under these headings and make up any data needed for purposes of illustration:

(a) Statement of the problem,
(b) Apparatus and methods of experimentation,
(c) The experimental data,
(d) Conelusions and summary.

IV. Class Notes on Lesson 1.

LESSON 2

THE RECEIVING MECHANISM

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. II., 31-44.

(2) Woodworth: Psychology, Chap. X., 187-196.

Read both references through once carefully. Examine the questions at the end of chapter II in Gates as well as those under "Class Preparation" below and then read the assignment again for the answers to the questions and exercises.

II. Notes on the Lesson:

(1) Keep clearly in mind that the term "sense organ" is not the synonym of "receptor." The former includes three things in many cases, viz., (1) the termination of a sensory nerve, (2) special sense cells, in some cases, and (3) accessory sense apparatus. The special sense cells are the receptors proper.

(2) As you read the description of the structure of each sense organ, decide which structures belong in each of the three classes specified above.

(3) Remember that the human organism cannot "sense" a stimulus throughout the whole range of possible stimuli, but only within an upper and a lower limit known as the limen or threshold, e. g., for audition these thresholds are about 16 and 30,000 vibrations per second. Do you think it likely that certain insects really make sounds above the limits of the human ear in pitch? Is the explanation why certain animals seem to make no sounds to be found in such facts?

(4) Many kinds of physical phenomena do not have any end-organs in the animals and man, e. g., electric (static) charges in the atmosphere. Can you think of other cases of this sort? Do we have a receptor for humidity or do we perceive humidity of the air through the skin senses proper? Which ones? Is the skin sense a single sense? If not, how many separate senses?

III. Class Preparation:

(1) Write out the answers to questions 1, 2, 4, 5, 6, 7, 9, and 10 on pages 43-44 in Gates. Number your questions.

(2) Work out in tabular form the following facts about each of the special senses:

(a) The end organ,

(b) The adequate stimulus (stating the thresholds),

(c) Structures composing the accessory apparatus,

(d) Estimated numbers of separate receptors in end organs.

Note: Include vision, audition, smell, taste, skin senses, and equilibrium.

IV. Class Notes on Lesson 2.

LESSON 3

THE CONNECTING MECHANISMS

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. III, 45-64.

Read the lesson through carefully, observing particularly these things:

(a) All technical terms like neurone, synapse, axone, dentrite, etc. Make a list of all these and write after each its definition.

(b) Study each diagram, especially Figures 10, 11, 12, 13, and 14. Be able to reproduce these without reference to the book.

(c) Familiarize yourself thoroughly with the meaning of each of the three levels of nerve pathways. Try to think of additional examples of each type.

II. Notes on the Lesson:

(1) Can you think of any ways in which the analogy of the nervous system to a telephone exchange breaks down?

(2) What bearing does the fact that a simple reaction time like the knee jerk takes 0.1 to 0.2 of a second have on the theory that nerve currents are electric currents?

(3 Will the statement: "All learning is modification at the synapses," hold true for multiplication of 3x7? For learning to curve a baseball? For breaking a habit?

(4) Under what conditions will a reaction on the first level rise to the second or third levels? Think of concrete cases.

(5) Can reactions learned on levels two and three ever fall to level one? Give some illustrations.

III. Class Preparation:

A. Required:

(1) Write out Exercises A and B, pages 63-4 in Gates.

(2) Write out answers to questions 5 and 6 under C on page 64.

B. Optional (for additional credit):

Make a list of the activities which you normally engage in between the hours of 6 a. m. and 12:00 p. m. After each one write the figures I, II, or III to indicate which level of nerve activity is chiefly concerned in each.

IV. Class Notes on Lesson 3.

LESSON 4

THE REACTING MECHANISMS

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. IV., 65-89.
Memorize the outline of the reaction systems on page 65. Then read the chapter organizing the material under these headings. Examine the exercises on pages 87-88 and then read the chapter again, selecting the answers to the questions.

II. Notes on the Lesson:

(1) In the total reaction time several distinct phases can be distinguished, viz., (a) excitation time for receptor, (b) conduction time for sensory nerve, (c) central time for coordinations within the spinal cord and higher centers, (d) conduction time of motor nerve, and (e) reaction time of muscle or gland, etc.

(2) In relative terms now do these five separate times differ, proportionately, in such activities as:
(a) the pupillary reflex,
(b) in solving the exquation $5x - 2 = 23$; $x = ?$
(c) in finding the opposite of the word "but".
Estimate the total time for reaction in each case.

(3) What direct and indirect evidence exists that the brain is the seat of consciousness?

(4) What facts presented in Chapter IV refute the views of the phrenologist?

(5) What bearing do the facts of Chapter IV have on the possibility of mental telepathy?

(6) In what respects does the blood stream have similar functions to the nervous system?

(7) Why is it better to use the meal time for conversation rather than for reading the newspaper?

(8) Are sensations or perceptions more numerous in adult life? Upon what do you base your answer? What is the difference between the two?

(9) Arrange these mental phenomena in order from the simplest to the most complex: intelligence, sensation, ideas, character, perceptions, consciousness.

(10) Where is the probable seat of consciousness?

III. Class Preparation:

(1) Write out Exercise A, pages 87-8 in Gates.

IV. Class Notes on Lesson 4.

LESSON 5

CONSCIOUS STATES AND PROCESSES: (1) GENERAL

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. V., 90-109.
Read the entire chapter through carefully. Then go through the chapter again "boiling down" the facts about each of the following topics. Note that "Sensation" is already summarized. Complete the summary as provided for under II. Notes on the Lesson.

II. Notes on the Lesson:

A. The Primary Conscious States:

(1) Sensations .....
- a. Are the simplest mental processes,
- b. Cannot be analyzed further,
- c. Can be classified as external or internal, or in terms of the sense organs (visual, olfactory, etc.)
- d. May be compounded, e. g., hunger,
- e. Are awareness of objects or events,
- f. Are responses to stimuli, external or internal,
- g. Are known only through introspection.

(2) Images .....

(3) Feelings .....

B. The Complex Mental States:

(1) Percepts .....

(2) Emotions .....

(3) Impulses .....

(4) Memory and Imagination .....

III. Class Preparation:

(1) Perform the experiment called for in question 2 on page 108 in Gates. Write out the results.

(2) Answer the following true-false statements by underlining the answers.

(a)	Sensations differ from images in being more vivid.	true	false
(b)	Adults have more pure sensations than perceptions.	true	false
(c)	When I say "I hear the train," hearing some sounds is sensation, but knowing that it is a train is perception.	true	false
(d)	"Mental set" and habit determine to a considerable extent what we see, hear, feel, etc.	true	false
(e)	The stimulus which arouses an image is external.	true	false
(f)	Ideas are complexes of images.	true	false
(g)	Emotions are simple irreducible mental states.	true	false
(h)	Pleasantness is a true emotion.	true	false
(i)	Perception involves recognition and past references; sensation does not.	true	false
(j)	Impulses tend to rise into consciousness when the proper stimulus is delayed or inhibited.	true	false

IV. Class Notes on Lesson 5.

LESSON 6

CONSCIOUS STATES AND PROCESSES: (2) FEELINGS AND IMAGINATION

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. V., 94-103.
Re-read these sections of the chapter as a preparation for the experiments under III below.

II. Notes on the Lesson:

(1) Perform the experiments under III alone in a quiet room.
(2) Follow instructions exactly.

III. Class Preparation:

A. Experiments on Feeling:

(1) The line below is divided into 7 equal parts to represent a scale of pleasant-unpleasant feelings. Place the 10 things listed below on this scale by writing *the number* of the thing on the line at that place on the scale which shows how *you feel about it.*

Extremely unpleasant or disagreeable	Markedly unpleasant	Somewhat unpleasant	Neutral: neither pleasant or unpleasant	Rather pleasant	Markedly pleasant	Extremely pleasant or agreeable

1. Dancing
2. Sight of blood
3. Odor of violets
4. Touching furry things
5. Watching a football game
6. Filing your finger nails
7. Eating chocolate ice cream
8. Taste of olives
9. Receiving an "A" in a course
10. Reading the newspaper.

B. Experiments on Images and Imagination:

(1) Arrange these 20 things in order of decreasing degree of vividness of the imagery aroused when you recall them. Imagine to yourself how each looks, "feels", smells, or tastes, etc. Place the most vivid first, making number 20 the least vivid.

a Sound of a mountain brook	1.
b. Appearance of the house in which you were born	2.
c. Chinning yourself	3.
d. Toothache	4.
e. Odor of onions	5.
f. Sound of "Old Black Joe"	6.
g. Appearance of Woodrow Wilson	7.
h. "Feel" of velvet	8.
i. Sound of train whistle	9.
j. Odor of violets	10.
k. Taste of parsnips	11.
l. Six-pointed star	12.
m. Your psychology classroom	13.
n. Pitch of middle C	14.
o. Being about to sneeze	15.
p. Alone at night in a cemetery	16.
q. Feeling dizzy	17.
r. Humming of bees	18.
s. Odor of burning feathers	19.
t. Taste of castor oil	20.

Now examine your ranking to see whether your imagery tends to reveal some "type", e. g., visual images show high average rank, or auditory, etc. In general how do the various kinds of images rank in position?

(2) (Note: Two persons are needed for this experiment.) Have some acquaintance serve as "Experimentor" (E.) while you act as the "Observer" or "Subject" (S.). Have E. time you, allowing 3 minutes for each part, or 15 minutes in all. Write down as many answers to each problem as you can in 3 minutes. This will serve to show something about the psychology of imagination.

(a) Suppose that on next January first absolutely certain information was obtained that the world would come to an end on the February first following; how would life during that January differ from an ordinary January?

(b) What might happen if 10 persons in the United States had the power of becoming invisible at will?

(c) Suppose that a rare and expensive drug was discovered which would enable the user to read the mind of any person; what might happen as a consequence of this discovery.

(d) What would happen if the moon were suddenly blotted out of existence?

(e) What would happen if the force of gravitation were completely destroyed?

IV. Class Notes on Lesson 6

LESSON 7

CONSCIOUS STATES AND PROCESSES: (3) THOUGHT PROCESSES

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. V., 103-108.
Re-read the above pages as a preparation for the experiments under section III below.

II. Notes on the Lesson:

(1) The experiments are of three kinds, viz., association of ideas, mental set, and reasoning.
(2) Two persons are needed; an Experimentor (E.) and yourself as Subject (S.).
(3) Work in a quiet room.

III. Class Preparation:

A. Association:

(1) E. selects a word at random from the following list and pronounces it to S., who immediately writes down every word or idea that comes to mind within 2 minutes. E. then repeats with a second word, etc., till 5 have been given. Write words below.

(2) Analyze the associations for (a) trends or runs, (b) changes in direction, (c) types of associations, e. g., by similarity, by contrast, etc. Draw any conclusions which you can form by examination of the results. Record any cases of "emotional blocking" or long delays, etc.

1. House
2. Circus
3. Football
4. Charity
5. Anger
6. Chicago
7. Piano
8. Love
9. Pain
10. Infinity.

B. Mental Set:

(1) Get the answers to these examples as quickly as possible.

(1)	(2)	(3)	(4)	(5)
Subtract	Subtract	Subtract	Subtract	Subtract
981	741	212	428	817
162	619	83	117	22
(6)	(7)	(8)	(9)	(10)
125	619	516	143	622
94	210	19	109	405

(2) Did you subtract in examples 6-10? Why? Would not adding or multiplying be suggested just as well by the statement and form of the examples? What conclusions can you draw about mental set as a guiding factor in thinking? Give other examples of mental set.

NOTE: If the success of this experiment is spoiled because you read the conditions in advance of the actual experiment, try it on some friend instead of yourself.

C. Reasoning:

(1) Given these facts:

C is greater than A
A is greater than B
B equals D

Get the answers to the 5 problems below and underline the correct solution.

Remember: These letters do not stand for any certain numbers. They are all indeterminate although they are assumed to be greater than zero. Do not try to substitute values for the letters since such substitutions will result in errors. Think them out in purely logical terms.

(2) As soon as you finish each problem, record the time for solving, and then write out a full account of your mental processes during the solution of the problem (introspections).

	Problems:		
1. A + B is greater than D	Always true	Always untrue	May or may not be true
2. B + D — A	Always true	Always untrue	May or may not be true
3. A + B + D is less than C	Always true	Always untrue	May or may not be true
4. C—B is greater than A—D	Always true	Always untrue	May or may not be true
5. C — B — D — A	Always true	Always untrue	May or may not be true

IV. Class Notes on Lesson 7.

LESSON 8

THE ORIGIN, DEVELOPMENT, AND CHARACTERISTICS OF INSTINCTIVE ACTIVITY

I. Assignment:

Gates: Psychology for Students of Education. Chap. VI.

(1) Read the sub-topics of this chapter in Table of Contents pp. xii.

(2) Read the chapter for general information. Look over the question on pages 129-131.

(3) Read the chapter intensively.

The subject matter discussed in Chapter VI will be the content of Lesson 8.

II. Notes on the Lesson:

One reads with greater profit and pleasure if he brings to his study pertinent speculations and questions. Following are such speculations which came to a reader's mind as he studied this chapter. Come to your own decisions concerning each as you study the chapter.

(1) Theory of the mind, according to which the new-born infant is like a blank sheet of paper on which parents, associates, and the environment in general may write what they please. Is this theory correct in the light of the assignment?

(2) Are anatomical traits appreciably modified by the environment?

(3) Does the expert tea-taster, or the bank cashier who detects a spurious bank-note by the "feel" of it, have a more highly developed sensory acuity than other persons who are quite unable to duplicate the achievements of such experts?

(4) Does capacity assure achievement?

(5) Can walking be taught to babies or is walking something that occurs independent of teaching?

(6) What is the fundamental criterion of the unlearnedness of an activity?

(7) Is there any sharp line of division between a reflex and an instinct? Between an instinct and a capacity? Between a reflex and a capacity?

(8) The Duke of Wellington is reported to have said, "Habit is ten times nature." Compare and contrast this with the discussion on pp. 124-126.

(9) Is the modern bookkeeper, artist, teacher, laborer, or what not better adapted to his work than Methuselah would have been under a similar environment?

(10) Why can you easily solve this example while a 6 year old mind could not regardless of the amount of study?

$$\frac{a^3-b^3}{a^2-9b^2}\times\frac{a-b}{a-3b}$$

(11) When a banker returns from a 3 months' vacation he has forgotten very little about his work and starts in again without having to re-learn or review. When a fifth grade pupil returns from his summer vacation he has apparently forgotten a large percentage of what he knew the previous June. Are "forgetting" and "inner growth" related?

(12) It baffles the imagination to attempt to see how the developed adult can grow from the babe or how the babe can grow from the fertilized ovum. Can you think of any analogies which would be useful? Is it true that a fruit tree loaded with apples was once a seed possessing "determiners"?

Cautions: Be sure to realize that

(1) Mere inner growth; i. e., enrichment of the neural patterns, development of glandular activity, etc., goes on *after* birth as surely as it does before birth.

(2) We can develop only *within* the limits set by the capacities of our nervous system. Thus, there are many sound waves no human ear can ever hear. Types of work and thinking require nerve patterns, a person does not possess cannot be done by that person. If an adult has a 10 year old mind he may live to be 100, study 10 hrs. a day, weigh as much as a genius but he will never "invent", "create", or do other work requiring a more richly developed nervous system.

(3) After one has lived for even a few months his acts are the joint product of unlearned abilities and of the results of learning. It is hard to tell in the particular instance just what is learned and just what is inborn.

(4) The original arrangement of neurones called our inborn equipment not only makes certain responses possible, but also accounts for the roots of our wants, desires, preferences, impulses. Pg. 124. Even habits which are learned are often but hand servants to inborn cravings. Inborn nature is dynamic, vital, impulsive.

(5) The strength of inborn tendencies wax and wane.

III. Class Preparation:

Answer the questions and exercises on pp. 129-131.

(1) Write your outline of chapter ("Question 1 in Text") immediately below this line.

(2) Write lists of traits called for in question 3 of text here.

_____ _____ _____ _____ _____

_____ _____ _____ _____ _____

(3) Question 7 (in text) after you have filled in the missing words in the 3 sentences given in the question. Write below 3 sentences of your own invention bearing on the chapter. *Print* lightly the words you would leave out of each sentence in testing another student.

(4) Question 15 (in text). Show how difficult it is to successfully fit into modern complex society. List here 15 things a 10 year old child does to-day as a matter of course which would have been unheard of even 100 years ago.

The following assignments are for pupils who are especially interested in this course.

(5) What is the value of a study of original nature. Write answer here:—

(6) What would be the physical appearance of an inborn tendency? Answer:—

(7) Could a bit of observed behavior predominately unlearned last for 1 second, 1 minute, 1 hour, 1 day, 1 year, 1 life-time? Answers:—

(8) Record some behavior you observed that was predominately inborn.

(9) Re-read Section II of syllabus headed "Notes." Write below additional notes, cautions, summarizing sentences, questions, that you think might help another student or which will aid you you in reviewing the chapter.

IV. Class Notes on Lesson 8.

LESSON 9

AN INVENTORY OF INSTINCTIVE IMPULSES

I. Assignment:

Gates: Psychology for Students of Education. Chap. VII.

(1) Read the topics listed under the chapter in Table of Contents, pp. xii. Spend a few minutes in answering the question, "What will the author probably say under each of these topics?"

(2) Read the chapter for general appreciation. Answer to yourself as many of the questions at the end of the chapter as you can.

(3) Read intensively pages 132-143 to new topic heading.

II. Notes on the Lesson:

Two lessons will be devoted to Chapter VII. The aim of this lesson is to get a clear idea of the chapter as a whole and to master thoroughly the content on pp. 132-143.

(1) From your intensive study of pp. 132-143 what are your reactions to the following sentences?

(a) It may be well to think of an instinct as a clean cut, closely organized entity or power which always produces the same response to a given situation.

(b) Conscious states are relatively unimportant in a discussion of instincts.

(c) Fear reactions are just as ready to act and as easily stimulated as ever but their usefulness has greatly decreased the last 100 years.

(d) Inborn tendencies provide that we not only fear but also see to it that we fear the right things.

(e) What effect do frequent "Don't touch that" injunctions have on young children?

(2) Especially important considerations are:—

(a) A total unit of behavior may involve many different inborn tendencies. Page 132, lines 13-16.

(b) Instincts rarely act in isolation one from the other.

(c) Any classification of instincts has to be arbitrary. The grouping or listing of tendencies around several names must not blind us to the fact that our inborn tendencies are very closely interwoven. Original nature is more of a unity than a collection.

(d) Many instincts under any of the 3 main heads are put in another category by other writers. There is no "nailed down" certainty in our classification.

(e) The description of the instincts should be well mastered so that in class discussion everyone will have the same understanding of what is meant by "manipulation," "self-assertion," etc.

(f) Care should be taken to have definite notions about the meaning of the phrase,—*is instinctively satisfying—;* page 137, last line.

III. Class Preparation:

(1) Be prepared to answer questions (pp. 154-157) numbers 1, 2, 3, 4, 5, 7, 12, 14, 15, 17, 18, 25.

(2) Bring to class advertisements which use the following instinctive appeals for their real power or "pull."

1 advertisement based on "to eat when hungry."
1 advertisement based on "manipulation."
I advertisement based on "satisfaction in mastery."
1 advertisement based on "collecting and hoarding."

(3) Write below five well constructed questions, the ability to answer which would, in your opinion, denote a genuine understanding and appreciation of the assignment.

(a)
(b)
(c)
(d)
(e)

IV. Class Notes on Lesson 9.

LESSON 10
INSTRUCTIVE ACTIVITIES

I. Assignment:

Gates: Psychology for Students of Education. Chap. VII.

(1) Read intensively pages 143-154.

(2) Review Lesson 9.

II. Notes on the Lesson:

Three main considerations are taken up in this lesson.

(1) The important and wide spread driving force of the inborn tendencies listed as the social instincts. Is it an over statement to claim that 75% of all we do has pretty straight-forward reference to one or more of the social instincts even in our complex and cultivated society?

(2) Human learning—that process through which our inborn tendencies are modified— is itself surely rooted in original nature. Unlearned proclivities to explore and master, the mind's desire, when rested and not sleepy, to be active, the tendency of a new response if pleasing to be experimented with again; these are bases of learning.

(3) What satisfies, we do not avoid and often seek, what satisfies controls our actions, what satisfies is largely inborn, the result of the fact that we have a human, rather than some other type of nature.

What annoys, we avoid and tend not to repeat, what annoys controls our actions—what annoys is, similarly, largely inborn.

Thus life, among other things, is a seeking of satisfactions and an avoiding of annoyances. We control ourselves and others most surely through the manipulation of satisfiers and annoyers. Differences in *what* satisfies and how *much* satisfaction an experience brings and in what annoys and how driving the annoyance is, are among the most important differences between humans.

III. Class Preparation:

(1) Be prepared on questions (pp. 154-156) numbers 6, 8, 9, 10, 11, 13, 16, 17 through 32.

Write your answer to question 20. *below*

1.	5.	9.
2.	6.	10.
3.	7.	11.
4.	8.	12.

Write your answer to question 30. *below*

dance
male hike
Christian Endeavor
hazing
football for players
football for spectators

Choose any 4 from the remainder of the list.

Write short summary for question 31 here.

Question 32. Answer for two friends. Call them A. and B.

(2) Bring to class advertisements whose appeals are based on

Parental behavior	(1 advertisement)
Mating behavior	(1 advertisement)
Gregariousness	(1 advertisement)
Social approval and disapproval	(1 advertisement)

(3) For extra credit—not required for a passing grade.
Write, in well organized fashion, your opinions on one of the following topics. Hand your paper in at any recitation. Label it, "For Extra Credit."

(a) The Relative Importance of the Instinctive Tendencies Which Operate in a University Population.

(b) Success Is Due to Not Only *What* Satisfies and Annoys but to *Intensity* of Satisfaction and Annoyance.

(c) An Analysis of the Instinctive Tendencies Which Account for Some Person's Behavior.

(d) How to Use "Curiosity" in the High School. Any instinct may be used in the place of Curiosity.

IV. Class Notes on Lesson 10.

LESSON 11
THE EMOTIONS

I. Assignment:

Gates: Psychology for Students of Education. Chap. VIII.

(1) Read the sub-topics of this chapter in the table of contents, pp. xiii.
Before reading the chapter spend a few minutes organizing what you already know concerning each topic listed on pp. xiii. Take time to frame for yourself questions, on each topic, that you expect the chapter to answer.

(2) Read the entire chapter "for intellectual fun"; i. e., as though you were not to be tested upon your study but wanted to find out the facts for your own satisfaction.

(3) Re-read the chapter with the notes (Section II) and the Class Preparation (Section III) in mind.

II. Notes on the Lesson:

How do our emotions fit into our general "reaction hypothesis"?

(1) Do the "satisfying and annoying states," which give life its value (see page 152) appear to be related to the autonomic system?

(2) Can you plan an experiment which would settle the question about the reality of emotions portrayed by actors?

(3) What in particular could a teacher do about pronounced emotional instability in a pupil?

(4) Page 160, lines 23-25 "—are *in part*—". What else are expressions the result of? Would an expression of emotion ever be, not only *the result of* motor adjustments but an adjustment itself?

(5) Page 172, lines 2, 3, 4, "habits of mental hygiene." What are these habits?

III. Class Preparation:

(1) Be prepared to discuss the questions in the notes (See. II).

(2) Summarize below in legible penmanship the chapter in about 10 compressed sentences.

Samples of summarizing sentences:

(a) When we receive unusually powerful stimulii we make not only motor responses but we make feeling responses. When the feeling responses are the fusion of many vigorous sensations we speak of them as an emotion.

(b) The mechanics of an emotion is the autonomic systems whose structure is as surely rooted in original nature as is the knee jerk reflex.

Write your summarizing sentences below. Number them.

1.

2.

(3) Write below 2 questions *on each topic* of chapter found on p. xiii. in preface. One of the questions on each topic is to be general, the other quite specific in nature.

Sample. General Question on topic "Classification of the Emotions." What is the physical condition of a man experiencing "general well being"?

Sample. Specific question on topic "Classification of the Emotions." Name 3 components of an emotional experience other than the obvious organic changes.

Topic Definition, General Question: (G. Q.)

Specific Question: (S. Q.)

Outward Expression. G. Q.

S. Q.

The Nerve Control G. Q.

S. Q.

Internal Changes. G. Q.

S. Q.

The Emergency Theory. G. Q.

S. Q.

Classification. G. Q.

S. Q.

The Effects. G. Q.

S. Q.

Must One Experience in Order to Act? G. Q.

S. Q.

The Need of Control G. Q.

S. Q.

General Emotionality. G. Q.

S. Q.

IV. Class Notes on Lesson 11.

LESSON 12

FURTHER CONSIDERATION OF THE EMOTIONS

I. Assignment:

Gates: Psychology for Students of Education. Chap. VIII.

(1) Review as thoroughly as needed Lesson XI.

(2) Prepare answers to questions on pp. 177-179. Leave out question 4.

(3) Do the written work called for in Class Preparation (See. III).

II. Notes on the Lesson:

(1) The analysis of one's own emotional experiences and the careful observation and study of the emotional aspects of the behavior of one's fellows is not only interesting but increases one's insight into motives, temperaments, and "human nature" in general. Try to study the next three or four clean cut "emotional experiences" you observe. Perhaps the next sentence will help you organize your observations.

(2) A general excitement, an increased sensitivity, an increased supply of energy ready for direction and expenditure are common to all emotions.

(3) Will the response be anger and fight, or will it be fear and flight, or will it be pity and tears, or will it be mutilated, disguised forms of these or other "emotional experiences"?

(4) Other components of emotional experiences (in addition to organic changes making for *energy)* are perceptions, memories, anticipations, ideas, habitual ways of responding, impulses to motor activity.

(5) In understanding an emotion which has been observed or in predicting what the emotional responses of a person will be, the *other components* must be reckoned with. These are often very subtle and easily overlooked.

(6) It is important to thoroughly understand the last paragraph on page 158.

(7) The emotional responsiveness of individuals is a trait of prime importance. It is useful to think of a person as "easily stimulated" or "stimulated with difficulty". Or this person will respond when the stimulus is 2 units strong, while to get the same response from that person a 5 unit stimulus must be applied.

(8) In general a person may be a "2 unit" or a "5 unit" in all situations, but variations must be watched for. Because in past experiences a person may be temperamentally a "2 unit" organization in all but one or two respects, in these he may need 3, 5, even 10 units of stimulation.

III. Class Preparation.

(1) In addition to preparing for the oral discussion of questions on pp. 177-179, prepare written discussions as follows:

(2) Illustration called for in question 2.

(3) List of fear provoking situations in question 7.

(4) Samples asked for in question 11.

(5) Question 18. Record the judgment of 4 persons—yourself and 3 other persons not studying this book. Have the judgments made on separate papers so that each person will not be influenced by the others.

	myself	1st person	2nd person	3rd person
Photo 1				
Photo 2				
Photo 3				
Photo 4				
Photo 5				
Photo 6				

For additional credit. Not required for passing grade.

1. A Summary of Cannon's "Bodily Changes in Pain, Hunger, Fear, and Rage." See page 180.
2. A Critical Description and Analysis of Several Bits of Behavior in Which the Emotional Aspect Was Important.
3. What a High School Teacher Should Know About Mental Hygiene.
4. A paper on any related topic, if topic is approved by instructor.

IV. Class Notes on Lesson 12.

LESSON 13

THE DYNAMIC ROLE OF INSTINCTS IN HABIT FORMATION

I. Assignment:

Gates: Psychology for Students of Education. Chap. IX.

(1) Read the topics of chapter IX in preface on page xiii. On how many of these topics have you some ideas or information before reading the chapter?

(2) Read the chapter pp. 181-203. Your first reading need not be excessively critical. Read for the plain interest you have in the subject.

(3) Read the chapter intensively after you have studied the "Notes" (Section II) and the Class Preparation (Section III).

II. Notes on the Lesson:

(1) It is wise to take time to realize the truth in this statement. "Life is largely a seeking of satisfactions and avoiding of annoyances—and what satisfies or annoys is in turn largely due to the fact that we have the instinctive drives we possess instead of others that we might have had.

(2) Not all people have the same instinctive drives in equal strength. What is a tremendous satisfier for one may be but a weak preference for another. Would it be wise for a young adult to have clearly in mind the relative strengths of his satisfiers and annoyers?

(3) Keep clearly in mind the relation between instinctive trends and learned habits. What are some good illustrations of habits which serve instincts?

(4) Thwarting of tendencies: Is it possible to be aware of thwarting? Can you observe unfortunate behavior in your fellows due to the unwise attempts to satisfy instinctive trends which must be thwarted or re-directed in order that the person be socially tolerable?

(5) The chapter describes methods of adjusting ourselves to thwarting of tendencies which are on the whole undesirable. Can you list desirable methods of self-management in regard to the necessary thwarting, subduings and redirections of original nature?

III. Class Preparation:

A. Be prepared to explain and illustrate in class the following phrases:

(1) Dynamic Role.
(2) Habits as "natural tendencies in disguise."
(3) Mutual antagonism of instinctive trends.
(4) We make multiple responses to an annoying situation until a satisfactory adjustment is found.
(5) Thwarting is more tolerable to some persons than others.
(6) The movie as a lazy man's introversion.
(7) Delusions of persecution.
(8) The human mind can make itself believe anything.
(9) We must keep our own self-respect at any cost. This fact occasions frequent ————.
(10) Adjustments via the "sour grapes" route.
(11) Although a professor of education, he carries a chestnut in his vest pocket to ward off rheumatism.
(12) The mechanics of breaking a bad habit.
(13) Supply evidence supporting or refuting the statement on Page 199, lines 26-29.

For extra credit:

(1) Submit in writing the above class preparation.
(2) A review of F. L. Wells—Mental Adjustments, pp. 206.
(3) 15 well described bits of behavior correctly diagnosed and explaining the adjustment and mechanisms which operated.

IV. Class Notes on Lesson 13.

LESSON 14

THE DYNAMIC ROLE OF INSTINCTS—(CONTINUED)

I. Assignment:

Gates: Psychology for Students of Education, Chap. IX.

(1) Review the chapter.

(2) Read pp. 200-204 with great care.

(3) Prepare questions on points in Chapter IX that are still unclear to you.

II. Notes on the Lesson:

(1) Gates' treatment of the sub-conscious mind should be mastered. Perhaps no other aspect of psychology has been more to the point in discussion than this so-called subconscious mind. The treatment in the text should clear your own thinking on this subject.

(2) Repressions (Freudian) and obscure behavior due to these "buried alive" tendencies are often spoken of as "mental complexes." While Freudianism has been overdone of late, it is only fair to realize that many of our impulses are unconscious in the sense that we do not realize what is driving us on to many acts. Freud, in stressing that aspect of the dynamics of behavior has rendered great service to the analysis of motives and to the diagnosis of mis-behaviors and mental and nervous breakdowns. To deny a problem is a poor way to solve it. The facts seem to be that instinctive cravings are forceful, are often thwarted, are repressed, are often lived out in devious and distorted ways, that they are sublimated frequently into useful endeavor. While the psychoanalytic school headed by Freud is not thoroughly established we should be respectful of its point of view and appreciative of its accomplishments.

(3) High school teachers are concerned not only with the teaching of algebra as such, and of Latin as such, but also with the formation of well organized, properly integrated, self-reliant personalities in high school pupils. This chapter may well be considered as one of the most important in the whole book.

III. Class Preparation:

(1) Be prepared to discuss in class the questions on pp. 205-206.

(2) Be prepared to defend your answers to the following questions:

(a) Can an act be purely instinctive after its first occurrence?

(b) Are social taboos as prevalent with us as they were with primitive peoples?

(c) Of the three kinds of restrictive factors listed on p. 182, which, if any, is probably the most powerfully and constantly operative in modern life?

(d) What evidence, if any, is there for the statement (p. 186) that the "unstable" person is mostly determined by original nature?

(e) Is the mechanism of introversion widely prevalent in "normal" persons?

(f) What is a "normal" person?

(g) Is there a clean cut distinction between "reasoning" and "rationalization"?

(h) Is there any overlapping of the "sour grapes" mechanism and "compensation"?

IV. Class Notes on Lesson 14.

LESSON 15

THE LAWS OF LEARNING

I. Assignment:

Gates: Psychology for Students of Education, Chap. X.

(1) Read table of contents in Preface, pp. xiii. Answer to yourself the question: "What do I already know about Learning that could be treated under any of the topics in the preface, pp. xiii?

(2) Read the chapter carefully, noting any of the text which is unclear. Frame questions on unclear sections to ask about at the next class recitation.

(3) Re-read the chapter intensively after reading the Notes (section II) and the Class Preparation (Section III).

II. Notes on the Lesson:

Give consideration to these questions:

(1) What are the dangers (to the students) of the lecture method?

(2) What are the differences between the learning of a speech (p. 222ff) and the learning involved in building up a skill in "chemistry" or "novel writing" or "developing the skills used in surgery"?

(3) As we learn or "profit by experience" do we meet simultaneous stimuli rarely or frequently?

(4) From the standpoint of the student is the Law of Effect used adequately and prudently by the average teacher?

(5) List some of the ways a teacher may control through the use of annoyers, through the use of satisfiers, under the Law of Effect.

III. Class Preparation:

(1) Prepare adequate discussions of the following for the class recitation.

(a) Learning is an active process of reacting.
(b) Learning is a native capacity.
(c) Law of Use.
(d) Law of Disuse.
(e) Learning is specific.
(f) In learning we do not build up from nothing but select out from many.
(g) How does a child get a concept of blue as a color?
(h) Practice cannot account for the whole of learning.
(i) The human mind will not do something for nothing.
(j) Advice on making the Law of Effect effective.

(2) Written assignment. Study the summary on pages 234-236. Without repeating verbatim this summary prepare a summary of your own of Chapter X. Organize your summary under not less than 5 and not more than 15 main topics, or explanations. Write your summary below.

IV. Class Notes on Lesson 15.

LESSON 16

THE LAWS OF LEARNING (CONTINUED)

I. Assignment:

Gates: Psychology for Students of Education. Chap. X.

(1) Re-read Chapter X in light of the previous lesson and the previous class discussion.

(2) List any questions about the subject matter of this chapter you wish to ask the instructor.

(3) Prepare the work called for in "Class Preparation" (Section II).

II. Notes on the Lesson:

Be sure that before this chapter is finished you appreciate these statements.

(1) Mere practice is nearly impotent. Effective practice is that which practices the correct specific connections, that which is sufficiently intense, that which is wisely distributed, that which is sufficiently frequent, that which allows the learner to know which responses are right and which are wrong.

(2) The Law of Effect to be most powerful must use Satisfiers and Annoyers which are genuine and real. These must be attached immediately, and attached to the specific connections to be strengthened or weakened.

(3) A third major Law of learning might be built on the fact that when connections are ready to act, to act is satisfying, when unready to act, to be forced to act is annoying, or an experience to be avoided (page 153). Thus the condition of the organism *at the time of learning* is important. Readiness to act in reference to the subject—being "ready"—greatly facilitates learning, unreadiness greatly retards learning. Readinesses for any activity fluctuate from time to time, almost from hour to hour. Thus to create readiness for the task in hand is one of the main tasks of the teacher. Readiness will be further discussed in the class period. Be sure that your Class Notes report your ideas about readiness.

III. Class Preparation:

(1) Be prepared to discuss in class the questions on pages 236-237, with the exception of questions 1 and 4.

(2) Be ready to give two illustrations of learning where the law of Effect seemed more powerful than the law of Exercise.

(3) Prepare two illustrations of learning where the Law of Exercise was the more powerful.

(4) Call to mind and note several skills which are but poorly mastered by yourself. Be ready to account for the lack of mastery through the failure of some law of learning to operate sufficiently.

(5) Decide on two things you do very well indeed. Be prepared to account for your skill in terms of the Laws of Learning.

(6) Write below your answer to question 4, page 236.

IV. Class Notes on Lesson 16.

LESSON 17

CHARACTERISTICS OF LEARNING IN COMPLEX FUNCTIONS

I. Assignment:

Gates: Psychology for Students of Education. Chap. XI.

(1) Speculate on the probable content of the chapter after reading the topics of chapter on page xiv of preface.

(2) Read the whole chapter to satisfy your intellectual curiosity relative to human learning.

(3) Re-read pp. 238-first 2 lines on 252 intensively after reading Section II and Section III of the syllabus.

II. Notes on the Lesson:

(1) From the standpoint of the psychology of learning, criticize the organization of this course. What constructive suggestions could you offer?

(2) Can your mastery of this assignment be explained in terms of content of Chapters XII, X, and XI?

(3) In terms of S-R connections, what difference are there between an accomplished scholar and a day laborer, between yourself this year and three years ago? What typical responses have the following gentlemen connected with some man well known by them all?

a minister
a surgeon
a teacher
a grocer
a life insurance expert
a hotel waiter

(4) What degree of learning or "over-learning" would be wise for the following: the telephone number of your residence, the birthday of your mother, the size of the shoe you wear, the price of sugar, the office hours of 10 doctors, the license number of your automobile, the number of electric lights in your house, that 2 plus 7 equals 9, the formula for the expansion of the binominal theorem, the axioms of plane geometry?

(5) Are skills full of motor responses such as typing, tennis, billiards, auto-driving, telephone operation and plumbing, more easily retained than skills full of S-R connections in the cortex, such as medical diagnosis, work of a judge, operating on the stock market, writing an "Introduction to Logical Theory"? Be ready to discuss and defend your answer.

(6) Is history the record of man's learning through trial and error? What is invention? What is research? What is progress?

(7) Why is it that we settle down comfortably while many of our skills are still far below the level of their possible limit?

COMMENTS

(1) It is important for the student to realize that "stimulus to arouse" (pp. 238, line 18) is not always an external affair. Our impulses often get ready to act, and we go out looking for experiences to satisfy them or to avoid the annoyance of having "nothing doing" when awake and rested. In this search, we "try and err"—and learn.

(2) Training the hand involves no new capacities of the hand. Certain muscles may be developed but new ones are not created. Manual learning then is largely the re-organization and combining of muscular responses which were there at the beginning. The process is not one of building up from nothing. (Page 241, line 6). Skills heavily weighted with ideas, such as pure mathematics, thinking up an argument, and the like, involve the use of original capacities also, but in a sense these "intellectual skills" are a building up from nothing for we have to acquire the content of the ideas. How man thinks, more than what he thinks is the re-organization of capacities provided by nature.

(3) The human is the great learner not only because his neurones are more modifiable (pp. 242, line 24) but also because he has more neurones to modify.

(4) While it is true that the big gains in a learning curve come first and easiest, it is the little gain at the top, a gain only one in a thousand ever makes that is the really useful gain. To increase

one's skill on a scale from 0-100, from 0 to 50 is of little value if your competitor goes from 0 to 60. If most men get to 60, a few to 70, and one in a thousand to 80, and only 3 men in the world to 90—the three men will be famous, men reaching 80, highly paid experts, the men rated at 70 are "also rans." Some people spend more time pushing up their learning curve of "whist" than the curves of those skills by which they are to earn their bread and butter.

(5) Expertness is perhaps as much a matter of learning not to do the irrelevant, as it is to do the relevant. It is a process of subtraction as well as of addition of S-R connections.

III. Class Preparation:

(1) List 10 S. R. connections, simple or complex, that you have overlearned thoroughly, another 10 pretty well overlearned, another 10 you have to re-learn when needed. What S-R connections would it be profitable in the end to overlearn that you have so far neglected? Write your lists here:

Thoroughly over-learned	Partially over-learned	S-R zero of strength
1	1	1
2	1	1
3	1	1
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10

S-R I ought to over-learn

1
2
3
4
5
6
7
8

(2) Be ready to suggest 10 items of information studied in this course which should be thoroughly over-learned.

(3) Be ready to suggest 10 items of information in this course which should be over-learned enough to be remembered only until after the final examination.

(4) What parts of to-day's assignment need be over-learned for a day's permanence only?

(5) Prepare (write on space below) 10 True-False statements on the context of pp. 238-252. The first two are printed.

1. Trial and error learning pervades nine-tenths of human learning
2. Man learns what he has to—not what he can.
3.
4.
5.
6.
7.
8.
9.
10.

(6) Solve this problem by either arithmetic or algebra and note false leads, wrong cues, i. e., trial and error in the process.

The acreages in Irish potatoes in Indiana in 1910 and in 1911 were 55,200 and 43,325 re-

spectively. If each of these acreages made a square field, how long would a side be? (Nearest .01 mile).

(7) Be ready to give an accountal of an instance of learning, following the 4 point outline on page 241.

(8) Prepare at least two statements both true and important which have to do with the "Education of the Emotions." Page 246, line 29. Write these two statements here.

(9) Be ready to reconcile (if possible) the two apparently contradictory statements. One statement begins on page 251 middle of line 1. The other on page 251, middle of last line.

(10) For extra credit (not required). A paper showing how one could deliberatcly control "trial and error" in order to improve his learning technique.

IV. Class Notes on Lesson 17.

LESSON 18

GENERAL CHARACTERISTICS OF LEARNING IN COMPLEX FUNCTIONS

I. Assignment:

Gates: Psychology for Students of Education. Chap. XI.

(1) Review Lesson in the light of the class discussion and your own Class Notes.

(2) Read intensively pages 252-262.

(3) Prepare work called for in Class Assignment (Section III).

II. Notes on the Lesson:

(1) It is true that we rarely develop our skills up to their physiological limit; it is also true that many skills need not be so developed, others cannot be because we do not know just what connections to form, still other skills are not developed because, while such development would be profitable, it would not be profitable when the expenditure in time and effort and necessary deprivations are counted.

(2) Many skills remain ineffective because, though improvement would be desirable, we are too lazy and too improvident. If a skill is just good enough to allow us to avoid the sting of a sharp annoyance, the impulse to try other ways is greatly weakened. At the same time the half-effective skill becomes habitual and to break a habit is so annoying, pp. 253, line 12 that we in a true sense find improvement itself annoying. Thus we find relative failure satisfying because it is habitual. What exists in the present ways of doing things in the nation, in city affairs, in our own habits are illustrations of "failure to improve because it is annoying."

(3) A careful analysis of the best class you were ever in and a similar analysis of the worst class you ever attended would reveal what differences in the following?

(a) Use or abuse of the Law of Exercise.

(b) Skillful manipulation of the Law of Effect.

(c) Provision for active "trial and error" by the pupil.

(d) Clear definition of what connections should be learned or over-learned with a definite strength.

(e) Being aware of presence of plateaus.

(f) Provision of recurring drills to battle with the act of Forgetting.

(4) What is your opinion about the truth of the old maxim, "Teacher passive, pupil active"?

III. Class Preparation:

(1) Be prepared to discuss in class the questions on pp. 262-263. Skip Question 2, 3, and the last part of 4, 11.

(2) Perform the following experiment and record on charts below.

(a) Subtract by 7 each time beginning with 81, keep going until you get to 4. Have some person keep your time, try this at least 7 times.

Do not practice before the first trial, or between recorded trials.

Record of trials for experiment 1 *Draw a practice curve below*

Time of 1st trial was ..... sec.
Time of 2nd trial was ..... sec.
Time of 3rd trial was ..... sec.
Time of 4th trial was ..... sec.
Time of 5th trial was ..... sec.
Time of 6th trial was ..... sec.
Time of 7th trial was ..... sec.
Time of 8th trial was ..... sec.

(b) Subtract by 18 each time beginning with 200, keep going until you get to 2. Record time of at least 7 trials. Do no practicing not recorded.

Record of trials for experiment 2

Time of 1st trial was ..... sec.
Time of 2nd trial was ..... sec.
Time of 3rd trial was ..... sec.
Time of 4th trial was ..... sec.
Time of 5th trial was ..... sec.
Time of 6th trial was ..... sec.
Time of 7th trial was ..... sec.
Time of 8th trial was ..... sec.

Draw a practice curve below

IV. Class Notes on Lesson 18.

LESSON 19

PRINCIPLES OR ECONOMY IN LEARNING

I. Assignment:

Gates: Psychology for Students of Education. Chap. XIII.

(1) Read the topics to be discussed in this chapter on pp. xiv of preface. What do you think the author has written under each topic?

(2) Read the chapter, not for test preparation but simply for important information.

(3) Re-read the chapter intensively in the light of the Notes (section 11 of syllabus) and the requirements for Class Preparation (section III of syllabus).

II. Notes on the Lesson:

(1) On page 265, line 13, the author speaks of "principles of economy." How do principles differ from laws? Would it be satisfactory to think of *principles as settled rules of action?*

(2) For your own study the following exercise may prove suggestive. Before re-reading the text again rewrite at the top of three sheets of paper the three divisions of principles, one division on each sheet, (page 265, lines 15-22), then list the items which should be under each principle. Do not confine your list to information from any one author but put down what you think ought to be put down. Prepare three similar sheets and organize the material in the text carefully. Compare the lists made by yourself and those based on the text. Organize in your mind, at least, final lists of principles of economy of learning.

(3) Of the two multiplication examples 407 and 457 which is the harder? Is the difficulty related to the multiplication table as learned in the 3rd grade?

$$\begin{array}{r} 309 \\ \hline \end{array} \qquad \begin{array}{r} 369 \\ \hline \end{array}$$

(4) Put together these two statements.

Learning is connecting (reacting).

I do not speak Spanish but you can.

(5) Page 271, line 26. To identify the exact reactions wanted is the business of any assignment. Skill in Lesson assignment is a large part of teaching.

What truth may there be in this statement and why?—The best teaching on a university campus is often that of the foot-ball instructor?

(6) Page 271. After all are not the statements "to be aware of progress" and "success is a great motive" rather exaggerated declarations?

(7) Page 277. Four steps necessary to eliminate errors are given. Which step is hardest to practice? Why?

(8) If you are to put in a 48 hour week on your job of going to college and 18 hours are spent in recitation and conference, you have 30 hours for study. How should that be distributed? Have you ever experimented with "length of study period" and "distribution of study periods"?

(9) What percentage of a 50 minute recitation is spent in just getting started and in stopping?

(10) Can general principles of learning be applied specifically to particular subject matter? Illustrate your answer?

(11) A certain professor lectures brilliantly when in his accustomed class-room behind his own desk. When forced to hold a class in a strange room, he becomes diffident and halting. Can this be explained?

At the beginning of the class period, questions from the class will be called for. If, after studying the chapter, you are in doubt on any matters, insist upon your questions being considered.

III. Class Preparation:

But one lesson will be devoted to the discussion of this chapter. Prepare for an oral recitation on each of the questions on pp. 294 and 295, except questions 8 and 11.

Observe the psychology of the learning going on in your recitations. Write below your judgment of them as follows:

Report below an example of a recitation which illustrated excellently some principle of learning.

Report I

Report II. Write below a criticism of some recitation which failed to observe some important aspect of the psychology of learning.

REPORT III. Report on a recitation as it happened and then describe in detail what changes would have been both practical and helpful.

For Extra Credit. Assuming that the methods of study used by college students are mostly self-discovered, (natural method p. 266, line 5), prepare a set of study directions for college freshmen which, if followed, are both practical and psychologically correct.

IV. Class Notes on Lesson 19.

LESSON 20

THE ACQUISITION OF PERCEPTS AND IDEAS

I. Assignment:

Gates: Psychology for Students of Education. Chap. XIII.

(1) Read the topics of this chapter on page xiv of the preface. Get clearly in mind what you already know about the topics to be discussed. What has your previous study of psychology told you about the nature of percepts, of analysis, of abstract ideas?

(2) Read the chapter through for information. This is using "The Whole Method of Learning."

(3) After studying the questions on pp. 322 and 323 and the notes in the syllabus re-read the chapter intensively for the "Class Preparation" (Section III).

II. Notes on the Lesson:

(1) Is it correct to think of percepts, abstract ideas, making judgments, reasoning, brooding over the past, or letting the mind travel in fancy as specific responses to specific stimuli?

(2) Is general language ability, or general arithmetic ability a generalized, unified something or is it a more or less loosely organized collection of specific S-R connections?

(3) Does a student need marked ability to deal with abstractions to complete successfully a college course? To be a successful business man, to be a successful philosopher?

(4) In the light of the discussion on p. 319 ff., would you say that people in general are moral?

(5) Could you list your ideals which are potent enough to effect your behavior? Can you trace the history of the growth of these ideals?

III. Class Preparation:

(1) Using percept in the sense of page 297, line 17 ff., would you have to see a whole dog in order to say, "There is a dog in the next room?

(2) Percepts of your dog fuse into an idea of a dog so that the dog is thought of when beyond the range of any of your organs of sense. Does your idea of your dog grow richer and more complex? Do ideas ever stop growing? Under what conditions do ideas become static?

(3) Would your perception of the workings of an intricate machine be the same as the percept of its inventor? Why? Could the Laws of Learning be applied to the building of percepts?

(4) Consider the situation of the third quarter of a foot-ball game. A British visitor who is a Rugby player gets percepts, so does the onlooker in the stadium, so do the coaches of the teams, so does a pilot of an airplane flying 600 feet above the gridiron. The percepts differ one from the other. Explain why.

(5) What is meant by this statement: "What we need is not acquaintance with more things but better insight into that with which we are already acquainted"?

(6) Write below an instance of the exercise of intuition. Then explain it as far as you find possible.

(7) Which of these definitions seems the best to you?

(a) When you find the difference between two numbers, you subtract.

(b) If one number is taken from another, subtraction is the name of the process.

(c) To find out how much smaller one number is than another, subtract.

(d) 7—4=3. This is subtraction. It tells the difference between 7 and 3.

(e) Subtraction is a way of finding (1) the difference of two numbers, or (2) the remainder after taking a part of the number from the number itself.

(f) 8—6=2. This tells that 8 is 2 more than 6. We find this out by subtraction.

(8) Be ready to discuss the following questions on pages 322-323. Nos. 5, 7, 8, 9, 10 (any two items), 15, 16, 17.

(9) Write sentences for question 12 below.

(10) Write sentences for question 13 below.

(11) Write 3 good definitions below.

(12) Write below a report of some work you have done as a student which required genuine "independent thinking." See page 296, line 9.

IV. Class Notes on Lesson 20.

LESSON 21

REASONING AND PROBLEM SOLVING

I. Assignment:

Gates: Psychology for Students of Education. Chap. XIV.

Read the topics treated in this chapter on page xiv of preface. Could you organize your knowledge of reasoning and lay down some rules to improve "ability to reason" before you read the chapter? Do you really *know anything about reasoning?*

(2) Read the chapter for the intellectual enjoyment it provides.

(3) After reading the Notes (section II) and the Class Preparation (section III) re-read the chapter intensively.

II. Notes on the Lesson:

(1) The ability to reason is one of the chief assets of the educated person. To improve our ability to reason is one of the main purposes of education. The chapter assigned for this lesson is unusually well organized and full of valuable information and suggestions. This lesson and the next merit the best study of which you are capable.

(2) In re-reading the chapter keep the following in mind: Why is it that a problem you cannot reason out during an evening's work is sometimes easily solved the next morning? Is the reasoning involved in making up a family budget the same or different from the reasoning used in constructing a code of ethics? What should high school pupils be taught about "skill in reasoning" and "methods of effective study"? Are the reasons given to justify the forming of a political party, a certain social "set" or a lodge always thought out *in advance?* What mechanism is often operating?

(3) People who get relatively little satisfaction or even annoyance from reasoning should hold this fact in mind when selecting a life work. Could all professions and livelihoods be placed on a scale showing the relative amounts of motor or "overt" requirements and relative amounts of "reasoning" required?

Wholly motor activity	Half overt action Half reasoning	Mostly pure reasoning
A ———	B/ ———	C

Where on the line would you place the locomotive engineer, the teacher, the policeman, the doctor, the philosopher, the dentist, the lawyer, the professional ball-player, the carpenter, the sales-girl, the business executive, the explorer, the miner, the minister?

(4) Is amount of experience an index of degree of profit from experience?

(5) What truth, what falsity is there in the proverb, "There is no royal road to learning"?

(6) An advertising slogan reads, "The Rule of the Brain Is Everywhere Plain." Is this true? Is reasoning more valuable now than ever before?

(7) Which college courses require the most reasoning? Which the least?

(8) When a situation loses its novelty, do we quit reasoning about it? Why?

(9) What is a general principle? (page 343).

(10) Is college work too easy or too hard? (page 347).

III. Class Preparation:

Two lessons will be devoted to chapter XIV. The object of this lesson is to get the *facts* of the chapter well in mind and to get these facts connected with pertinent matters and properly related.

(1) Be ready to discuss the Notes (Section II). Why were the notes put in question form?

(2) Write below an outline summary of the chapter.

(3) Write below at least 5 questions on the chapter, the adequate answering of which would reveal mastery of the chapter.

(4) Be ready to discuss the following:

(a) Do we reason to learn or learn to reason? If we reason to learn, we reason to learn *what?* Page 325, line 1.

(b) Why do we think of the clever things to say after the opportunity to say them has passed?

(c) Is reasoning to action as sub-vocal speech is to oratory?

(d) Skilful reasoning is often suspended under great emotional stress. We become like animals. Why? Give illustrations.

(e) Page 327, lines 27 and 28. If the author had given two more characteristics of good reasoners, what might the two characteristics have been?

(f) Expand this statement. Good reasoning is partly an economical and prudent use of "trial and error" as contrasted with a wasteful and careless use of "trial and error."

(g) What is "genius"?

(h) What high school subject would you prefer to teach? What opportunities for "reasoning" does that subject provide. Take one bit of work in that subject and show how reasoning would be used in doing this work.

(i) What is "originality"?

IV. Class Notes on Lesson 21.

LESSON 22

REASONING AND PROBLEM SOLVING

I. Assignment:

Gates: Psychology for Students of Edueation. Chap. XIV.

Re-read the ehapter in the light of the previous class discussion.

II. Notes on the Lesson:

(1) Ability to reason in any particular field involves a mastery of the facts, the presence of a problem to be solved, a desire to solve the problem, a critical selection of the facts and their interrelation, a eombining or "putting together" of the facts in a new form—or building of new facts out of the given faets—called the solution; lastly an impersonal "ehecking" of results to determine the soundness and adequacy of the solution. It is important to realize that individuals differ in their ability to reason. These differences are partly due to training, to opportunities, to varying degrees of wanting to reason; these differences in ability to reason are also partly due to inherent, inborn differences in the intellectual equipment of the individuals. They are also partly due to the degree of mental maturity. The organization of the eortex does not permit a six year old to do what the twelve year old (greater inner growth and maturity) can do.

(2) Differenees in final ability to reason often appear to be due to differences in opportunity and the world seems to play favorites. But diffcrences in original capacity are morc determinative than we realize. Two apprentiees enter a second-class apotheeary shop. One apprentice is forgotten. The other becomes Pasteur. Pasteur had no better opportunity than thc unknown man. But the inborn equipment of these two apprentiees must have been far from identical.

(3) It is also important for the student to realize the tremendous differenee in difficulty between thinking out a solution for the first time and seeing that it is correct *after* someone else has done it. All of us understand inventions we would never have discovered, though they seem absurdly simple now. Probably the number of people who have the eapacity to think new things *first* is fairly small. At present the public sehool system has few, if any, provisions for the conservation of genius. What provisions would you deem both practical and effieient?

III. Class Preparation:

Be ready to discuss the following:

(1) Page 328, lines 10-22, describes two characteristics of reasoning. There are at least two more. What are they?

(2) What variations in the organization of this syllabus (additions and subtractions) would you suggest in order to facilitate "reasoning" and the mastery of psychologieal "generalization" by the student?

(3) Question 1, page 350, Questions 3, 4, 8, 10, 11, 12, 13, 15, 16, 17, 18.

(4) A student onee flatly refused to answer question 3. Did he have a "eomplex" or was he justified?

(5) Write below your answer to Question 7. Do 6 in preparation and then write clearly on "How to Solve This Puzzle."

(6) Write your answer to Question 14. Be sure to list *all* the suggestions given. Include in this list suggestions of your own.

(7) Below are solutions of the same problem offered by grade pupils. A wrong answer is often due to wrong reasoning. Tell what mistakes in reasoning occur in each solution. Use analysis of reasoning, page 333, lines 20-25.

A man goes on a trip, taking $200.00 for expenses. His carfare was the total of these items: $17.62, $14.50, $31.67. His hotel bills averaged $5.00 a day for 7 days. Incidentals were $15.00. How much had he left from his $200.00.

Solution I.

17.62	48.29	200.00
31.67	35.	98.29
	15.	
48.29		101.71 answer
	98.29	

Solution II.

17.62	63.79
31.67	35.00
14.50	15.00
63.79	113.79 answer

Solution III.

17.62	83.79
31.67	5
14.50	
5.00	415.79
15.00	200.00
83.79	215.95 answer

Solution IV.

17.62	200
31.67	112.79
14.50	
	87.21 answer

62.79+15+35= 112.79

Solution V.

200	17.62
50	31.67
150	14.50
63.29	63.29

86.21 answer

Solution 1.

Solution 2.

Solution 3.

Solution 4.

Solution 5.

(8) Extra assignments (not required for passing grade). List rules of logic to help in reasoning (see page 346). Prepare paper giving authentic account of the work and study habits and techniques of a great thinker. A paper on any problem arising from your study of the chapter subject approved by instructor.

IV. Class Notes on Lesson 22.

LESSON 23

ANALYSIS OF OVERLEARNING

I. Assignment:

Study the Syllabus. Section II.

II. Notes on the Lesson:

Analysis of material to determine the relative amounts of over-and under-learning:

The psychology of learning should be applied and used in the construction of the material that a pupil studies as well as applied in the recitation or the silent study of the pupil himself. The texts commonly in use at the present time give little heed to the proper distribution of practice among the elements of a subject.

Study the following chart:

Chart showing the frequency of practice on the seven cases of factoring in a standard book in algebra for the first year of high school.

PRACTICE IN THE SEVEN PRIMARY CASES OF FACTORING

TAKEN FROM "X" ALGEBRA TEXT

Case of factoring	Number of problems given in each case for a period of twelve weeks (three months).												
	First Month				Second Month				Third Month				
	1	2	3	4	5	6	7	8	9	10	11	12	Total
Case I.	35	10	17	9	44	11	8	16	30	3	23	28	234
Case II.	39	50	8	0	8	11	9	10	6	4	11	6	162
Case III.		50	20	0	15	4	11	10	16	9	23	15	173
Case IV.			60	48	26	13	12	16	15	10	17	20	237
Case V.				65	57	20	19	18	7	2	9	3	200
Case VI.					26	1	0	3	9	4	4	5	52
Case VII.					4	0	1	4	2	2	3	3	19
													Grand total—1077

Assignment A:

Let us assume that the study of algebra warrants the mastering of all seven cases of factoring so well that each case can be worked easily.

(1) Why is the distribution of practice among the seven cases what it is according to the above chart?

(2) Is the seventh case so easy that it does not need more practice?

(3) Is the fourth case so hard that it needs as much practice as it receives?

(4) Which cases are over-learned?

(5) Which cases are under-learned?

(6) Do you think that the author had the principles of the psychology of learning well in mind as he constructed his text?

(7) Suggest a distribution of practice over the seven cases of factoring that you think would be more respectful of the laws of learning.

Assignment B:

We should provide children not only with enough practice sometime during the year but we should distribute the practice through the year. Thus to practice the simple multiplication 6x9 ten times through the fifth grade may be sufficient practice as a whole but to give all the ten practices in September and none the rest of the year would be poor psychology.

Question 1. Why would all the practice in September be poor psychology?

When *general* reviews are provided they should practice the whole skill or as much of the whole skill as possible. That is, in a general drill on the multiplication of whole numbers as many number combinations should be practiced as possible.

Question 2. Below are two multiplication drills, taken from two different arithmetic texts. Analyze these in some fashion to show what specific multiplication combinations receive practice and how much practice on each combination is provided. Then tell which general drill you think is best and why you prefer it. A good table to use in your analysis is one like this. Use separate tables for each set.

Thus the practice in the example 42x7 would be recorded as shown in table. 7x2 is practiced once, 7x4 is practiced once.

Multiplicand

Multiplier	0	1	2	3	4	5	6	7	8	9
0										
1										
2										
3										
4										
5										
6										
7			1		1					
8										
9										

Your answer to question 2 assignment B shows the specific practice in multiplication combinations provided by the two sets of drill.

Question 3. Prepare similar charts to show the amount of *carrying* in the addition provided in the two sets. Use separate tables for each set. A good chart to use is one like this:

Example: 47x13=611. There are two carryings (1) in getting 141, two is carried to 12 (use only units in the table), (2) one is carried to four when partial products are added. Table shows the record of these two carryings.

Number carried to

Number carried	0	1	2	3	4	5	6	7	8
0					1				
1									
2			1						
3									
4									
5									
6									
7									
8									

Remember, there are *four* charts in all to be prepared.

DRILLS TO BE ANALYZED

SET A

(1)	978	(2)	325	(3)	682	(4)	823	(5)	435	(6)	632	(7)	563
	506		324		726		983		481		408		481
(8)	408	(9)	507	(10)	802	(11)	532	(12)	4437	(13)	7080	(14)	7236
	662		836		906		848		42		93		69

(15) 8192 83	(16) 7762 54	(17) 8087 36	(18) 8129 53	(19) 6666 66	(20) 3437 91	(21) 4646 17

SET B

(1) 568 3	(2) 234 89	(3) 548 76	(4) 568 885	(5) 124 54	(6) 279 8	(7) 568 109
(8) 569 45	(9) 289 467	(10) 134 3	(11) 156 289	(12) 479 55	(13) 279 377	(14) 842 2
(15) 356 76	(16) 760 670	(17) 379 216	(18) 479 99	(19) 356 76	(20) 378 45	

Question 4. Make any other comparisons between these two sets which you think are valuable.

Caution. In preparing your lesson be sure that you have clearly labelled each of the following:

Assignment A—1, 2, 3, 4, 5, 6, 7.

Assignment B—1, 2 (two charts), 3 (two charts) and 4.

In connection with this lesson you may make up for poor work in some other lesson or help to insure a high grade for the course in the following way: Take a school text which you know best and make with it a significant study of the distribution of practice of some important element in it. In preparing the report be sure that you do it so that one unfamiliar with your thought or your text can understand what you are trying to do. Make it a model of clearness.

III. Class Preparation:

Write answers to questions in Section II below. Use back of this sheet for charts.

Assignment A. Question 1.
Question 2.
Question 3.
Question 4.
Question 5.
Question 6.
Question 7.

Assignment B. Question 1.
Question 2.
Question 3.
Question 4.

Report Extra Credit Work below.

IV. Class Notes on Lesson 23.

LESSON 23-a

The construction of a Drill Exercise which is Psychologically Meritorious.

This lesson is not required. It may be done for extra credit.

Using the ideas gained from the study of the text and the working of the last lessons construct a drill exercise bearing the following in mind:

(1) Assume that the skill has been learned and the exercise you are going to construct is to keep all the constituent elements strong through pratice.

(2) Your drill must then have at least one drill on every item of the total skill.

(3) If your drill practices some elements oftener than others then the harder elements should receive the greater practice.

(4) Some recording device should be worked out so that a critic can tell what has been practiced in your drill without analyzing your drill himself.

(5) Take any skill you wish.

Suggested Topics. A general drill on the subtraction of fractions. A general drill on the multiplication of whole numbers, a general drill on the division of decimals, a general drill on the total skill of factoring in algebra, a general drill on the ability to recognize the subjunctive forms in Latin. Do not choose the mental function or the total skill you are to make a general drill upon in too great a hurry. Take a skill that you are interested in or that you know something about.

Example of Drills and Their Analysis. Below you will find an example of general drill which has been considered satisfactory for this assignment. You should study it with care.

EXAMPLE A

Drill of the Multiplication of Whole Numbers

127	285	469	208	319	475	380	524	961	748
31	68	87	79	402	80	95	886	487	907
279	618	537	409	227	634	728	951	580	749
55	690	216	706	94	33	672	117	34	549

ANALYSIS OF EXAMPLE B

Distribution of Combinations

	1	2	3	4	5	6	7	8	9	0	
1	3	2	1		1	1	2		2		13
2	1	1	2		1		2	1	1		9
3	2	1	3	2	1	2	2	1	1	1	15
4	2	2	1	1	1	1	2	1	3	1	15
5		3	1	2	1		3	1	3	1	15
6	1	1	2	1	2	1	2	3	1	1	15
7	3	2		2	1	2	2	3	3	2	20
8	1	3	1	4	4	3	1	1	1	1	20
9	1	3	1	2		1	3	4	1	2	18
0	2		1	3		1	2	2	2	1	14
	16	18	13	17	12	13	21	17	18	18	

The rows are multiplicands.

The columns are multipliers.

This analysis should have contained answers to such questions as these:

(a) What addition drill is also provided?

(b) What carrying drill is also provided?

Record your drill below.

Record your analysis of drill below.

LESSON 24

THE TRANSFER OF TRAINING

I. Assignment:

Gates: Psychology for Students of Education. Chap. XV.

(1) Read the topics on page xv. of the preface. Skim through the chapter in order to get a general idea of the subjects considered in the chapter.

(2) Read the chapter carefully, primarily for purposes of acquisition of knowledge not in order to organize facts for a formal test.

(3) Read the Notes (Section II of Syllabus) and the Class Preparation (Section III) and then re-read the chapter intensively for class preparation.

II. Notes on the Lesson:

(1) It is important to keep clearly in mind the possibility of negative transfer. It is careless to assume that if exercise in one skill affects performance in another skill the effect is always beneficial or positive.

(2) When we consider the possibilities of a skill developed in one set of circumstances or in one type of work being transferred to another set of circumstances or to a different type of work, it is useful to ask the question: "What is transferred?" We have no mental powers which are tools or organizations, or entities that we can use as we can turn a search light to be equally useful in *any direction.* Our intellectual skills are not potencies, fairies, or Gold Dust Twins which can skip into any type of work at our bidding. Even "Memory" is but a word to sum up many different skills ranging all the way from mechanical repetition to an intensive, complex, analytical attack upon new material. What is transferred are responses to specific situations. We do not transfer abilities but use the same S-R in different situations. Thus if we learn that 7+2=9 it will be transferred to this task

add 2
3
4
7
2
—

(3) It must not be held that S-R connections as simple as 7+2=9 are the only ones capable of transfer. "Identical bonds" are what are transferred but these bonds may be very subtle and perhaps fairly intricately organized. Scientific research, however, has led us to have less rather than more faith in "transfer."

(4) "Transfer" may go on consciously or unconsciously. We do not know yet how much transfer can go on when intelligent and persistent attempts are *consciously* prosecuted.

(5) It leads to disappointment to study one language in order to be a master of another; it may not lead to disappointment to study good methods of work in college and then to *remember* to apply the same habits of work after commencement.

III. Class Preparation:

(1) Write below your own statement of the problem of transfer.

(2) Write below such considerations as seem to make the problem of transfer important to the teacher.

(3) Write below a summary of those facts of transfer which seem both fairly well established and also significant.

(4) Write below 5 questions upon the subject matter of this chapter. The following are four questions considered good ones.

(a) Miss X .obtains from her pupils in arithmetic written work of a high grade of neatness; is it safe to assume that the same pupils will write compositions for Miss X. with the same degree of neatness?

(b) Could a teacher settle the question of transfer of training so far as her own subject is concerned? How?

(c) Is it sufficient to teach the multiplication table and let it go at that?

(d) Can moral behavior be aided and abetted by the inveterate reading of novels full of high moral action?

Write your questions below. Number them.

(5) Be prepared to discuss in class the following questions or exercises on pages 374 and 375. Nos. 2, 4, 5 (three examples), 7, 8, 9, 10, 13, 14, 15, 16, 18, 19, 20.

For extra credit (not required for a passing grade):

(a) Prepare a paper on topic 17, page 375.

(b) Prepare a written *critical review* of Heck's "Mental Discipline."

IV. Class Notes on Lesson 24.

LESSON 25

INDIVIDUAL DIFFERENCES: (I) GENERAL

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. XVII., 398-420. Read the entire chapter through carefully. Next, study Questions and Exercises, numbers 1, 2, 3, 4, 5, 7 and 9, on pages 419-420 until you are sure of their meaning. Read the chapter once more and select the answers.

II. Notes on the Lesson:

The following facts and principles about the nature and extent of individual differences should be remembered:

(1) Individual differences are based upon the biological fact of variation.

(2) Individual differences (variations) follow the laws of chance, i. e.,
   (a) The frequency curves are symmetrical and bell-shaped,
   (b) Small deviations are more numerous than large deviations,
   (c) Deviations above the average are just as numerous as those below the average,

(3) The complete description of the range of individual differences in any trait requires that the following things be known:
   (a) What trait is under consideration,
   (b) How many cases are involved (how adequate is the sampling),
   (c) Some measure of central tendency, e. g., the mean (average),
   (d) Some measure of variability (dispersion), e. g., the mean deviation or the standard deviation.

(4) Individual differences in one trait may correspond to similar differences in a second trait; in which case they are said to be "correlated". If they show no tendency to vary together, they are said to be "uncorrelated". For example, the grades earned by school children are correlated with their scores in intelligence tests but are not correlated (presumably) with the color of the pupils' eyes or how many blocks they live from the school house.

(5) Individual differences are due to two general sorts of causes:
   (a) Heredity (family, race, and sex differences)
   (b) Environment (home, school, church, etc.)

Note: Most traits are influenced by factors of both sorts although some are due to heredity alone and some to environment alone. Try to decide which of the following list are:

chiefly hereditary
chiefly environmental
mixed.

1. Eye-color _____
2. Ability in geography _____
3. Honesty _____
4. Height _____
5. Wealth _____
6. Business ability _____
7. Acuity of vision _____
8. Shape of head _____
9. Good manners _____
10. Color of hair _____
11. Will power _____
12. Morality _____
13. Ability to spell _____
14. Interest in golf _____
15. Intelligence _____

III. Class Preparation:

(1) Indicate your answers to the list of traits above by marking them as follows:

"H" if hereditary, or chiefly so

"E" if environmental, or chiefly so

"M" if mixed.

IV. Class Notes on Lesson 25.

LESSON 26

INDIVIDUAL DIFFERENCES: (1) SPECIAL PROBLEMS

I. Assignment:

Gates: Psychology for Students of Education, Chap. XVII., especially pages 406-418. Read this part of the chapter again as an aid in the Class Preparation below.

II. Notes on the Lesson:

(1) The problems below are given in order that you may have some actual practice in the handling of educational data dealing with individual differences.

(2) The problem of coin tossing will show the general facts about the frequency distribution in a purely chance situation.

(3) The reading and arithmetic scores were obtained on 64 6th, 7th and 8th grade pupils on a standard test for these subjects.

(4) Refer again to the Notes on the Lesson for Lesson 25, especially notes 2 and 3.

(5) The theoretical numbers of heads and tails for any number of coins can be found by expanding the binominal equation:

$(x+y)^n$; where n is the number of coins (e. g., pennies) used.

Thus for 5 pennies, $(x+y)^5=x^5+5x^4y+10x^3y^2+10x^2y^3+5xy^4+y^5$.

The coefficients of the six terms in the binominial when expanded are 1, 5, 10, 10, 5, and 1. We would therefore expect the following in 32 tosses of 5 pennies:

5 heads—0 tails	1 in every 32 tosses.
4 heads—1 tail	5 in every 32 tosses.
3 heads—2 tails	10 in every 32 tosses.
2 heads—3 tails	10 in every 32 tosses.
1 head —4 tails	5 in every 32 tosses.
0 heads—5 tails	1 in every 32 tosses.
(Sum)	32

(6) Experiment with the expansion of the binominal $(x+y)^n$ for other values of n, e. g., 2, 3, 4, etc.

III. Class Preparation:

(1) Expand the expression $(x+y)^6$, as above, and compare with the coefficients in column (a), headed "Theoretical Frequency," in the table below.

(2) Take 6 pennies and toss all at a time for 64 tosses. Use a small box to toss the pennies in. Record the numbers of heads and tails in column (b). Note: Nickles or dimes, etc., can be used instead of pennies but all coins must be of the same kind.

(3) Tabulate the reading scores given below in column (d), using the grouping of column (c).

(4) Tabulate the arithmetic scores in column (f), using the grouping of column (e).

(5) Compare the frequencies of your tosses (b), reading scores (d), and the arithmetic scores (f) with the theoretical values of column (a). Which frequency distribution resembles the theoretical most closely?

(6) Do the distributions for reading and arithmetic follow the probability curve closely enough to justify the assumption that pupils' abilities in their school subjects are distributed according to the curve of chance?

(7) What bearing do these results have on the plan of grading pupils by such schemes as:

5% of A's
20% of B's
50% of C's
20% of D's
5% of E's

TABLE

	(a) Theoretical frequency	(b) Obtained frequency 64 tosses of 6 coins	(c) Scores in reading	(d) Frequency	(e) Scores in Arithmetic	(f) Frequency
6H-0T	1		250-274		240-259	
5H-1T	6		225-249		220-239	
4H-2T	15		200-224		200-219	
3H-3T	20		175-199		180-199	
2H-4T	15		150-174		160-179	
1H-5T	6		125-149		140-159	
0H-6T	1		100-124		120-139	
(SUM)	64	64		64		64

Scores of 64 sixth, seventh, and eighth grade pupils in a standard reading and arithmetic test.

Pupil	Reading	Arithmetic	Pupil	Reading	Arithmetic
1	247	236	33	242	224
2	149	132	34	102	144
3	176	164	35	250	236
4	180	184	36	222	228
5	251	236	37	170	188
6	202	199	38	186	192
7	223	208	39	214	232
8	134	156	40	207	184
9	169	164	41	141	156
10	163	172	42	190	193
11	196	180	43	186	181
12	189	204	44	195	204
13	188	200	45	229	212
14	246	244	46	240	232
15	147	136	47	170	184
16	190	197	48	162	152
17	198	168	49	175	168
18	215	204	50	188	189
19	215	208	51	184	185
20	202	216	52	191	190
21	126	124	53	164	148
22	149	188	54	174	164
23	159	176	55	185	187
24	157	190	56	179	189
25	171	191	57	186	152
26	168	160	58	206	196
27	159	164	59	153	148
28	244	220	60	162	152
29	211	232	61	165	160

30	203	216	62	139	185
31	188	208	63	205	193
32	202	180	64	153	152

(8) Examine the paired scores above and decide which of the following statements are true:

(a) The correlation between reading and arithmetic is about zero.
(b) The correlation between reading and arithmetic is positive
(c) The correlation between reading and arithmetic is negative
(d) The correlation between reading and arithmetic is very low.
(e) The correlation between reading and arithmetic is perfect.
(f) The correlation between reading and arithmetic is fairly high.

IV. Class Notes on Lesson 26.

LESSON 27

INTELLIGENCE: (1) TESTS OF INTELLIGENCE

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. XVIII., 421-435.

(2) Terman: Measurement of Intelligence, Chap. V., 65-77, and Chap. VI., 78-104. (Note: Read pages 78-81 carefully and skip through the balance of the chapter, reading a few case studies of feeble-minded, normal, and superior children).

Examine questions 1, 2, 3, 5, 6, 7, 9, and 15 on pages 451-452 of Gates.

II. Notes on the Lesson:

(1) Distinguish carefully between the I. Q. and the M. A. The former might be called a measure of "brightness," the latter a measure of "mental level" or "maturity". The M. A. alone does not give us a very meaningful picture of a child's mentality since a mental age of 12-6 might be earned by three different children whose C. A.'s were, respectively, 10-2, 12-4, and 14-9. The first would be rather "bright" (I. Q., 123), the second just normal (I. Q., 101), and the last rather dull (I. Q., 85).

(2) Would the point score (e. g., 108) on a group test correspond to the M. A. or the I. Q.?

(3) Are the I. Q.'s of unselected children distributed according to the probability curve? (See Terman, p. 66).

(4) Are boys more intelligent than girls? Why are there more feeble-minded men in our institutions than women? Why do more men than women achieve fame?

(5) Would the M. A.'s and the C. A.'s of children within the same grade be positively or negatively correlated? Are the youngest children of a given grade the most intelligent?

(6) Examine the actual tests in the upper year levels of the Binet test (Terman, 255ff.). Would you conclude that the Binet tests measure chiefly sensation, perception, and attention; or chiefly memory, imagination, comprehension and reasoning?

III. Class Preparation:

(A) Required:

Write out your answers to questions 1, 2, 3, 5, 6, 7, 9, and 15 in Gates, pages 451-452.

IV. Class Notes on Lesson 27.

LESSON 28

INTELLIGENCE: (2) APPLICATIONS OF TESTS

I. Assignment:

(1) Gates. Psychology for Students of Education, Chap. XVIII., 435-453. Examine particularly questions 10, 11, 13, and 14, page 452.

(2) Extra credit will be given for readings in Pintner: Intelligence Testing, Part III., pages 173-396.

II. Notes on the Lesson:

(1) Samples of the test materials for the Binet, Army Alpha, National, Terman, etc. intelligence tests will be given out in class for examination.

(2) Examine the questions suggested in Gates before reading the assignment.

(3) Criticize or defend the statement by Terman that morality depends upon two things: (a) the ability to foresee consequences (intelligence), and (b) willingness to act in accordance with such foresight.

(4) Outline at least three lines or argument which you could advance for the usefulness of intelligence tests in connection with school work, grading, and promotion (see data on pages 439, 440, 442, 443, and 446 in Gates).

(5) What other factors, other than intelligence, contribute to:

(a) morality,
(c) school success,
(b) vocational success,
(d) social adaptability?

III. Class Preparation:

A. Required:

(1) Write out answers to questions 10, 11, 13, and 14 in Gates, page 452.

(2) Answer the following true-false statements by underlining the correct answer:

(a)	Teachers tend to promote by M. A. rather than C. A.	true	false
(b)	Language work shows more relation to intelligence than handwork	true	false
(c)	Some persons are too intelligent for their jobs.	true	false
(d)	Imbeciles are more intelligent than idots.	true	false
(e)	At least 10% of school children are feeble-minded.	true	false
(f)	There are more children below the average in mentality than above the average.	true	false
(g)	Psychologists are agreed that the bright child is sickly, nervous, and unsocial.	true	false
(h)	Training will raise the I. Q. of the feeble-minded to equal that of normal children.	true	false
(i)	The I. Q. is a measure of brightness.	true	false
(j)	Group tests are more reliable than individual tests like the Binet.	true	false
(k)	The older children of a school grade do poorer work than the younger.	true	false
(l)	Mental age is a measure of learning ability.	true	false
(m)	A mental age of 12 years means that the child can do just as difficult mental tasks as the average child of twelve, regardless of how old such a child actually is.	true	false

(n) The Army results show that there are differences in intelligence in occupational groups. true false

(o) All delinquents are feeble-minded or borderline. true false

(p) The I. Q. does not change much from year to year. true false

(q) Performance tests depend more upon language ability than tests like the Binet. true false

(r) The ideal plan of classifying pupils would put all pupils of the same I. Q. in the same grade. true false

(s) The correlation between arithmetic and intelligence is roughly 0.50. true false

(t) All pupils of the same M. A. should be put in the same grade. true false

(u) The Binet tests are too easy for most adults. true false

(v) Performance tests are better for use with the foreign born and deaf than language tests. true false

(w) The average child of three knows its sex. true false

(x) Thorndike has made a test for college students. true false

(y) Group tests are more influenced by school training and other environmental factors than are individual intelligence tests. true false

B. Optional (for extra credit):

(1) Hand in outlines of any chapters of Part III. of Pintner: Intelligence Testing, pages 173-396.

IV. Class Notes on Lesson 28.

LESSON 29

MEASUREMENTS OF TRAITS: (1) EDUCATIONAL

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. XIX., 454-464.

(2) Kelley, T. L., Ruch, G. M., and Terman, L. M.: Manual of Directions, Stanford Achievement Test, pp. 1-17, 39-42, and 52-58.

II. Notes on the Lesson:

(1) Read the questions on pages 480-481 of Gates before studying the assignment in detail. Numbers 1, 2, 3, 4, 7, 11, and 14 are espeeially important.

(2) Most educational tests apply only to single school subjects, e. g., the Courtis arithmetic tests, the Thorndike-McCall reading tests, the Iowa spelling scales, the Gregory-Spencer geography test, the Hotz algebra test, etc. Certain disadvantages arise from this situation, e. g.,

(a) Some apply in one grade, others in other grades only,

(b) Some are standardized with grade norms, others with age norms,

(c) To test all subjects means that from 6-12 different tests must be ordered from a half dozen different publishers, and many different sets of directions for giving must be mastered.

(d) If age norms are not given, it is impossible to make close comparisons with intelligenee tests which are *always* standardized with age norms. The achievement quotient (educational age ÷ mental age) technique demands age norms for educational tests.

(e) Grade norms are less valuable than age norms (See Note 3 below).

(3) What are the relative merits of age and grade norms? Think over these further questions before framing your answer. Which of these facts represents more nearly a faet of human nature and whieh a fact of environment: a ehild 12 years old or a child in grade 6?. Does the coneept, "a child of 12" or a "pupil in grade 6" come nearer to having the same meaning for all school systems and all parts of the country? If a ehild is in the wrong grade (in the sense that his educational ability places him in another grade) would comparing his edueational achievements with his grade or his age be the more meaningful?

(4) What advantage does a "battery" of tests like those of the Stanford Aehievement Test (see samples) have over isolated tests for purposes of educational measurement and classification?

(5) Suppose we had means of obtaining all of the following facts about every school pupil:

(a) mental age

(b) ehronological age

(e) educational age

(d) moral age

(e) physiological age

(f) . soeial age

If you could know but one of these, whieh one would provide the most adequate basis for classifying pupils into the eorrect school grades? Arrange the 6 "ages" into the order of decreasing importance for purposes of classification. If you could use but two of these, which would you seleet? If three, which three?

(6) Suppose that the normal age for grade 5 is 11 years, grade 6 is 12 years, grade 7 is 13 years, etc. State in which grade each of the following pupils belongs. Defend your classification.

	Pupil A	Pupil B	Pupil C
Mental age	12-8	12-1	14-5
Chronological age	11-4	14-9	12-1
Educational age	12-9	12-5	14-10
Physiological age	12-1	13-1	14-0
Social age	12-4	13-0	13-9
Actual grade at present	V	VII	VI

III. Class Preparation:

(1) Write out answers to questions 1, 2, 3, 4, 7, 11, and 14 in Gates, pages 480-481.

(2) Write out your answers to questions 3, 4, and 5, under "Notes on the Lesson" above.

IV. Class Notes on Lesson 29.

LESSON 30

MEASUREMENT OF TRAITS: (2) PSYCHOLOGICAL

I. Assignment:

(1) Gates: Psychology for Students of Education, Chap. XIX., 464-482.

11. Notes on the Lesson:

(1) Read the assignment once carefully. Refer to questions 6, 8, 9, 10, 12, and 13 in Gates, page 481. Re-read the chapter and select the answers to these questions.

(2) Examine the portion of the Woodworth-Mathews psychoneurotic questionaire (Gates, 465). Would the success of such a test depend upon the honesty and frankness of the person taking the test? Would the test probably be more diagnostic if the reaction times for each question were recorded? Would delays in answering the questions due to "emotional blocking" be significant?

(3) What sources of error occur to you in rating schemes for human traits? Make a list of such.

(4) How would you explain the fact that girls have practically the same average intelligence year by year as boys, but girls excel boys in most school subjects?

(5) Although no cases (or very few) of strikingly large sex differences have been found to date, with the exception of certain physical traits, if such cases are finally discovered, in what sorts of traits would you expect the largest differences to occur? Note: One of the best established of such traits is that of reading interests. Is this native or acquired? Suggest others that you think might be established as the results of further study.

III. Class Preparation:

(1) Write out the answers to questions 6, 8, 9, 10, 12, and 13 in Gates, page 481.

(2) Draw a circle of about 6 inches in diameter. Draw two radii so as to enclose about 40% of the total area. Label this area general intelligence. Divide up the remainder of the circle into proportional areas which in your judgment would represent the relative influences of each of the following factors on the school success of school or university students. (Note: the value 40% for intelligence is based upon a considerable number of correlation studies which seem to indicate that general intelligence as measured by our present tests will account for roughly 40% of the total factors involved in school success). The other possible factors are:

1. Will and perseverance,
2. Interest in studies,
3. Time devoted to outside work,
4. Time devoted to outside activities,
5. Health,
6. Previous training.

IV. Class Notes on Lesson 30.

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